Wilt-Resistant Tomato Varieties

Released by the Illinois Station

By W. A Huelsen

Circular 490

UNIVERSITY OF ILLINOIS · · COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION AND EXTENSION
SERVICE IN AGRICULTURE AND HOME ECONOMICS

CONTENTS

TO SECURE SEED

The Illinois Station is not in a position to supply samples of the seed of any of the new tomato varieties to the general public. Certain seed companies, however, have entered into a written agreement with the Station to grow these varieties and list them. The stock seed was raised by the Department of Horticulture of the Illinois Station and every effort was made to assure varietal purity.

Further particulars as to sources of seed will be supplied on request to the Agricultural Experiment Station, University of Illinois, Urbana.

This Circular is a revision of No. 448
issued in 1936 under the same title

Urbana, Illinois January, 1939

Printed in furtherance of the Agricultural Extension Act approved by Congress May 8, 1914.
J. C. BLAIR, *Director*, Extension Service in Agriculture and
Home Economics, University of Illinois

Wilt-Resistant Tomato Varieties

Released by the Illinois Station

By W. A. Huelsen, Associate Chief in Olericulture

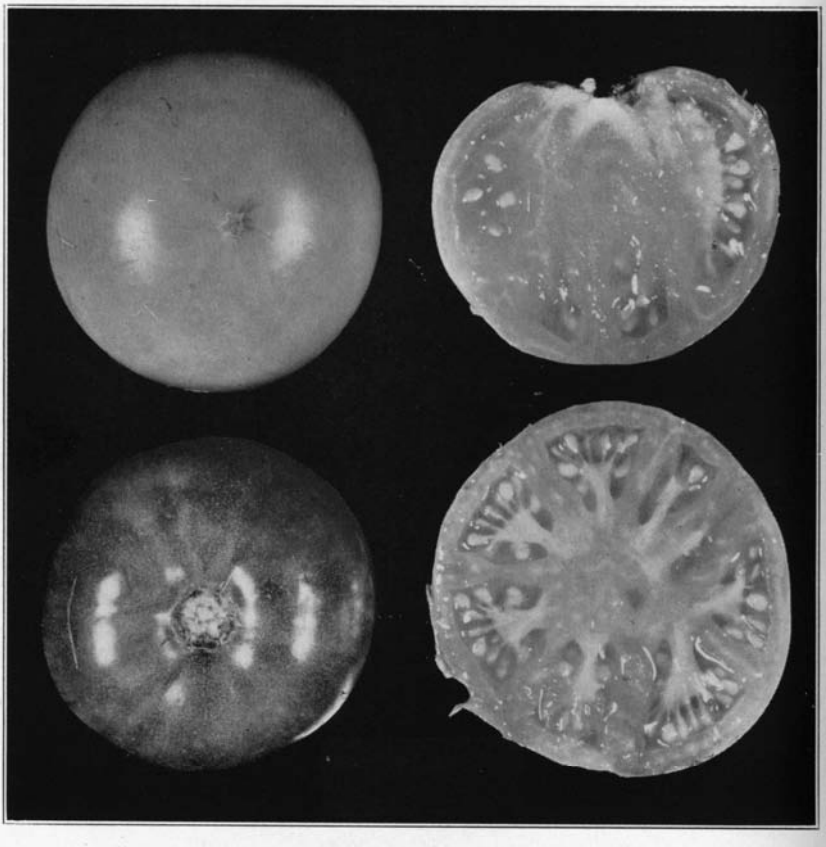
THE RAPID expansion of tomato acreage in Illinois and the difficulty of securing suitable varieties have directed much attention to the problem of breeding better adapted varieties of this popular crop. Most of the field varieties now in use have originated in the eastern states, and few of them will produce a satisfactory crop in the constantly recurring heat and drouth periods which characterize the corn-belt climate. In addition the danger of severe losses from Fusarium wilt, a disease which seems to be spreading rapidly, further limits the growers' choice to the wilt-resistant varieties, few of which have proved particularly satisfactory in Illinois.

Four field varieties resistant to Fusarium wilt[1] have been released by the Illinois Agricultural Experiment Station under the names *Early Baltimore, Prairiana, Illinois Baltimore* and *Illinois Pride.* These are a part of the results to date of twelve years of tomato breeding.

Tomatoes have also increased in popularity as a greenhouse crop but, as is true of the field crop, there is a dearth of suitable varieties. Few growers will venture to raise a fall crop under glass because standard varieties of American origin yield poorly and those of English origin have fruits that are too small for American markets. For spring forcing most of the varieties grown are simply field types which may not yield well under glass. In addition, Fusarium wilt has become very prevalent in Illinois greenhouses, and this has limited the growers to a few recently introduced varieties resistant to the disease.

Five varieties resistant to Fusarium wilt[1] have been bred at the Illinois Agricultural Experiment Station especially for greenhouse use and these have been released under the names *Blair Forcing, Sureset Forcing, Urbana Forcing, Lloyd Forcing,* and *Long Calyx Forcing.* These greenhouse varieties are not suitable for growing in the field.

[1]Fusarium wilt (*Fusarium lycopersici* Sacc.)



PRAIRIANA

FOR FIELD

(Resistant to Fusarium wilt)

Origin. Selected in 1926 out of a variety test of Marvana, the plant being materially larger and later. Resistant to Fusarium wilt from the start.

Maturity. Second early, slightly later than Pritchard and comes into bearing same time as J.T.D.

Vine type. Intermediate in size, with somewhat finely cut foliage suggestive of Earliana, which was one of the parents of Marvana. Vine tends to be straggly but growth is definitely restricted. Blossoms set very freely, commencing early in the season. On poor soils vines

have a very restricted growth and bear many small fruits. As total vine growth is restricted, Prairiana will produce well on well-drained, dark-colored silt and clay loams of the prairie type where other varieties frequently run to vine.

Fruits. Deep red, deeply oblate, and smooth, usually round in cross section. Sutures are very shallow and blossom scar is small. The basin at the stem end is shallow. The flesh color is an unusually bright red and is evenly distributed, rind is thin, core small. Prairiana is a free seeder. The fruits are unusually juicy and acid. The seed cells vary in size and in number from five to seven. Cracking, when it occurs, is of the concentric type and is shallow.

Yields per acre (U. S. No. 1 and U. S. No. 2)

1930—*On dark silt loam, prairie type*
Prairiana, 6.69 tons; Marglobe check, 3.69 tons.

1931—*On dark silt loam, prairie type*
Prairiana, 10.65 tons; Greater Baltimore check, 3.59 tons.

1932—*On rolling gravelly loam low in fertility*
Prairiana, 8.80 tons; Marglobe check, 10.36 tons.

1934—*On dark silt loam, prairie type*
Prairiana, 10.06 tons; Marglobe check, 4.44 tons.

1935—*On eroded silt loam low in fertility*
Prairiana, 6.52 tons; Pritchard check, 6.45 tons.

1935—*On heavy black clay loam high in fertility*
Prairiana, 7.43 tons; Pritchard check, 6.62 tons.

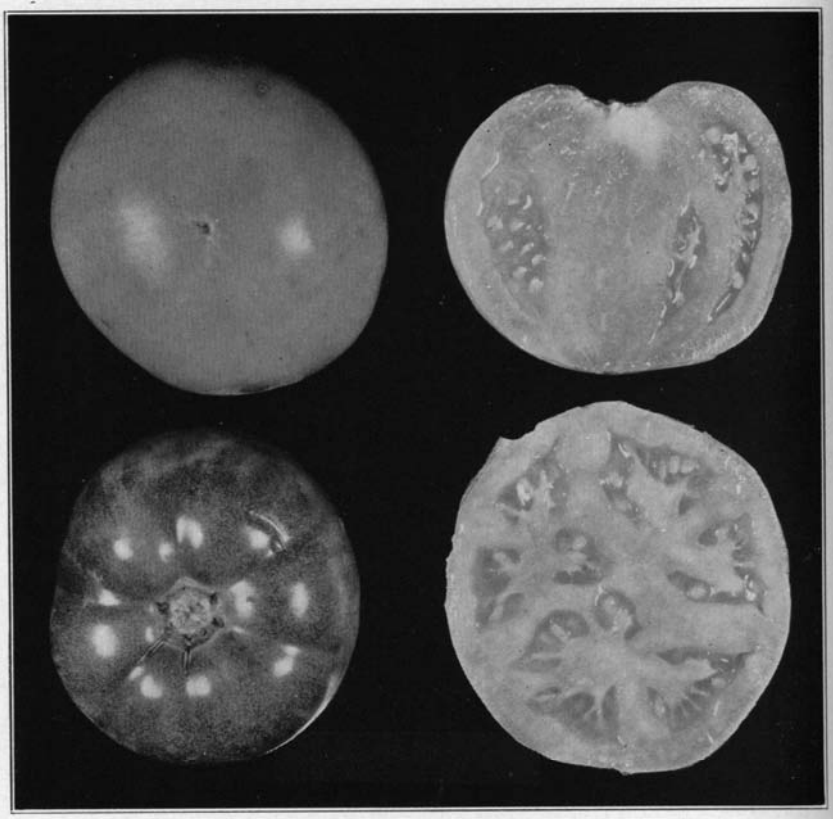
1936—*On eroded silt loam low in fertility*
Prairiana, 1.62 tons; Pritchard check, 1.86 tons.

1936—*On heavy black clay loam high in fertility*
Prairiana, 4.34 tons; Pritchard check, 4.12 tons.

1937—*On dark silt loam*
Prairiana, 6.24 tons; Pritchard check, 6.69 tons.

Thus in the dry years of 1930, 1931, and 1934 Prairiana gave large increases over the varieties used as checks. In a normal year like 1932 on poor soil Prairiana was inferior to Marglobe. In the normal year 1935, Prairiana on poor soil was no better than Pritchard, but on a heavy, fertile soil it was slightly better. In 1936, another year of extreme drouth, Prairiana and Pritchard yielded about the same on both fertile and poor soils. The following year, 1937, was normal, and Prairiana again yielded about the same as Pritchard.

Use. Prairiana is recommended for fertile soils, especially the heavy types, which are likely to be high in nitrogen in dry, hot years. Its superiority is best demonstrated in adverse seasons. Excessive vine growth has never been observed. This variety is suitable for market purposes and canning, especially for tomato juice and purée.



EARLY BALTIMORE

FOR FIELD

(Resistant to Fusarium wilt)

Origin. Selected originally in 1926 for resistance to Fusarium wilt out of a field of Indiana Baltimore badly infected with Fusarium wilt. Probably an accidental cross or a mutation.

Maturity. Belongs in the second early group, maturing slightly later than John Baer, but ahead of Pritchard on light-colored soils.

Vine type. Intermediate in size, growth determinate, smaller than Indiana Baltimore; foliage more finely cut and habit more decumbent. Blossoms set early and rather freely. No trouble with excessive vine growth on high nitrogen soils.

Fruits. Red, smooth, deeply oblate, small scar, small core, shallow basin at stem end, solid and meaty with a thick rind. Seed cells vary

from four to many. Early Baltimore is only a moderate seeder. Fruits are about the same size as Marglobe. Cracking varies with the season but is mostly of the concentric type and shallow. The fruits retain most of the desirable characters of the Indiana Baltimore but are much deeper in shape and mature a week to ten days earlier. The interior red color tends to be somewhat light.

Yields per acre (U. S. No. 1 and U. S. No. 2)

1930—Early Baltimore, 5.37 tons; Marglobe check, 2.38 tons.
1931—Early Baltimore, 7.82 tons; Greater Baltimore check, 2.18 tons.
1932—Early Baltimore, 9.39 tons; Marglobe check, 9.09 tons.
1934—Early Baltimore, 7.57 tons; Marglobe check, 4.30 tons.
1935—*On eroded brown silt loam, low in fertility*
Early Baltimore, 6.51 tons; Pritchard check, 6.45 tons.
1935—*On heavy black clay loam, high in fertility*
Early Baltimore, 7.17 tons; Pritchard, 6.62 tons.
1936—*On eroded silt loam, low in fertility*
Early Baltimore, 1.96 tons; Pritchard check, 1.66 tons.
1936—*On heavy black clay loam, high in fertility*
Early Baltimore, 4.45 tons; Pritchard check, 4.36 tons.
1937—*On eroded silt loam, low in fertility*
Early Baltimore, 9.57 tons; Pritchard check, 9.39 tons.
1937—*On heavy black clay loam, high in fertility*
Early Baltimore, 6.78 tons; Pritchard check, 6.53 tons.

Early Baltimore is particularly adapted to midwestern conditions of extreme heat and shortage of moisture. In such drouth years as 1930, 1931, and 1934 it proved superior to Greater Baltimore and Marglobe. In the extremely dry year of 1936 Early Baltimore yielded a little better than Pritchard on two soil types, Pritchard being considered a drouth-resistant variety and fairly well adapted to midwestern conditions, especially when grown on the darker soils. In normal seasons such as 1932, 1935, and 1937, Early Baltimore yielded slightly more than either Marglobe or Pritchard.

Use. Early Baltimore has become popular in many sections as a canning variety and also proves to be satisfactory for market purposes. It is especially suitable for canning because it retains the Greater Baltimore character of quick, even ripening. Numerous tests show that Early Baltimore is particularly well adapted to the dark-colored prairie loams without danger of excessive vine growth and blossom drop even when nitrogen reaches a high level. On poorer soils its performance is not so satisfactory as some of the larger-vined types. Altho Early Baltimore will not yield consistently more than Pritchard, it is more satisfactory than that variety because defoliation is less, fruit color is better and cracking less severe.

ILLINOIS PRIDE

FOR FIELD

(Resistant to Fusarium wilt)

Origin. One of the earliest wilt-resistant types produced by systematic breeding. Selected for resistance about 1913 by C. E. Durst, formerly of the Illinois Station; by 1917 seed of the variety was produced under the name "Century" and distributed to growers in Union county, Illinois. "Century" was a selection out of a variety called "New Century" and had a high degree of wilt resistance. It did not become popular in Union county, possibly because the growers pre-

ferred a pink tomato. In 1925 the author found a few seeds of "Century" which, when grown in central Illinois, had tremendous vines and very late maturity. Continued selection has reduced the vine size and increased earliness so that Illinois Pride is now quite different from "Century."

Vine type. Large vines of the Stone type, heavy foliage, blossoms and matures rather late. The vines hold their leaves well. Excessive vine growth must be guarded against in the same manner as in other late varieties. The plants are unusually resistant to Fusarium wilt.

Fruits. Red, smooth, very deeply oblate, round or nearly so in cross section. Rinds are thick, cell arrangement varies, and cell number varies from four to very many. The cores are small and there is a large, meaty central region which makes the fruits very attractive when cut. The blossom scar is medium size and the basin at stem end is shallow. Illinois Pride is a moderate seeder. In tests for solidity and shipping ability it was considerably superior to Marglobe.

Yields per acre (U. S. No. 1 and U. S. No. 2) *on eroded, light-colored silt loam*

1930—Illinois Pride, 4.49 tons; Marglobe check, 3.32 tons.
1931—Illinois Pride, 4.40 tons; Greater Baltimore check, 2.60 tons.
1932—Illinois Pride, 9.76 tons; Marglobe check, 8.89 tons.
1934—Illinois Pride, 3.86 tons; Marglobe check, 3.74 tons.
1935—Illinois Pride, 5.43 tons; Marglobe check, 5.31 tons.
1936—Illinois Pride, 1.26 tons; Marglobe check, .83 ton.
1937—Illinois Pride, 4.78 tons; Illinois Baltimore, 5.89 tons.

Illinois Pride gives small but consistent increases over Marglobe from year to year, but is not so productive on prairie soils as Illinois Baltimore. However, Illinois Pride has larger and firmer fruits than Marglobe and Illinois Baltimore and is superior to them in quality. Illinois Pride fruits do not crack nearly so badly as Marglobe.

Use. Illinois Pride is a good market tomato and, being firm and symmetrical, is a good shipper. It has very superior canning qualities. It has given satisfactory results in both northern and southern Illinois, New York, in the southwestern states, and in the irrigated sections of Utah. The variety should be grown with caution on highly fertile prairie soils, because, like most late types, it is subject to excessive vine growth.

ILLINOIS BALTIMORE

ILLINOIS BALTIMORE

FOR FIELD

(Resistant to Fusarium wilt)

Origin. This variety has the same parent as Early Baltimore. The two varieties were separated from the common parent in the second generation of selection (1927) and have been maintained separately since then. The variety was first introduced to the trade in 1936.

Vine type. Medium large vines of the Greater Baltimore type having a tendency to hold the foliage better than the usual strains of this variety. Like Indiana Baltimore, its parent, Illinois Baltimore tends to produce excessive vines on heavy loams high in nitrogen.

Fruits. Red, smooth, medium large, oblate, considerably deeper than ordinary Greater Baltimore, and nearly round in cross section. Cores are small, usually concentrated, rinds medium thick, cells small to medium in size, arrangement usually irregular. Color is bright red and texture firm.

Yields per acre (U. S. No. 1 and U. S. No. 2) *on eroded, light-colored silt loam*

1930—Illinois Baltimore, 3.00 tons; Marglobe check, 2.40 tons.
1931—Illinois Baltimore, 3.70 tons; Greater Baltimore check, 3.00 tons.
1932—Illinois Baltimore, 8.80 tons; Marglobe check, 8.34 tons.
1934—Illinois Baltimore, 5.78 tons; Marglobe check, 3.95 tons.
1935—Illinois Baltimore, 5.70 tons; Marglobe check, 5.36 tons.
1936—Illinois Baltimore, 1.90 tons; Marglobe check, .74 ton.
1937—Illinois Baltimore, 5.94 tons; Greater Baltimore check, 4.46 tons.

Illinois Baltimore yields consistently more than Marglobe and is more productive than the usual strains of Greater Baltimore. The maturity is the same as that of Greater Baltimore.

Use. Illinois Baltimore is primarily a canning variety. It may be substituted for Greater or Indiana Baltimore and has the added advantage of wilt resistance and more symmetrical fruits. Like other varieties in the main crop group, it is subject to blossom drop and excessive vine growth in drouth years.

BLAIR FORCING

BLAIR FORCING

FOR GREENHOUSE

(Resistant to Fusarium wilt)

Origin. A cross between Louisiana Pink and Grand Rapids Forcing, introduced in 1930, described in Illinois Station Bulletin 361 (now out of print). Selection has been continued to the fifteenth generation, but without any particular success in changing or improving the type.

Vine type. Very rapid and vigorous in growth; reaches the usual topping height of 9 feet two or three weeks sooner than Bonny Best or Marglobe. Blooms very freely and sets an average of 3.4 mature fruits per cluster in the fall without hand pollination; daily shaking of the vines is all that is required. Averages 5.6 mature fruits per cluster consistently in the spring. Foliage is medium green.

Fruits. Pink, smooth, flattened, with five or more small seed cells usually arranged in irregular order. Small core, rind medium in thickness, and fruit very solid and usually free from the puffiness which characterizes many varieties. The flavor is tart and pleasant. Blair Forcing is a free seeder. The blossom scar is small and basin at stem end shallow. The flesh is deep red and the fruit is excellent for slicing. In adverse seasons the fruits on some clusters may become rough, but the set is heavy enough to permit thinning these out at a very early stage.

Yields. Yields of Blair Forcing are much superior to those of Bonny Best and Marglobe and only a little less than yields of Lloyd Forcing (see table, page 22). The fruits are somewhat smaller than Lloyd Forcing.

Use. Blair Forcing is a pink tomato adapted for either fall or spring production. The fruits are somewhat small but very solid and excellent for salad purposes. The variety matures about 10 percent more of its crop than Marglobe during the first month of picking in the fall and 20 percent more in the spring.

SURESET FORCING

SURESET FORCING

FOR GREENHOUSE

(Resistant to Fusarium wilt)

Origin. A cross between Urbana Forcing and Blair Forcing now in the seventeenth generation from the cross.

Vine type. Intermediate between the two parents in habit of growth and in foliage. Vines a trifle slower growing than Blair Forcing and leaves somewhat finer cut and darker in color. Blooms very freely and sets fruit at the same rate as Blair Forcing.

Fruits. Pink, and in outward appearance closely resemble Blair Forcing. The interior is different, as shown by comparing the illustrations on pages 12 and 14. Sureset Forcing has a thicker rind than Blair Forcing and larger and fewer cells. Continued observations show that Sureset Forcing often has a larger sized fruit than Blair Forcing but is not so heavy. Sureset Forcing also tends to be more deeply oblate.

Yields. Sureset Forcing yields a little heavier than Blair Forcing as a rule. In a test in the fall of 1934 on a commercial scale Sureset Forcing showed an increased yield over Blair Forcing of 12.6 percent.

Use. Sureset Forcing is a pink tomato which may be grown either in the fall or in the spring. It may be substituted for Blair Forcing by growers who prefer somewhat larger, but not heavier, fruits. The quality of the fruit is not so good as that of Blair Forcing.

URBANA FORCING

URBANA FORCING

FOR GREENHOUSE

(Resistant to Fusarium wilt)

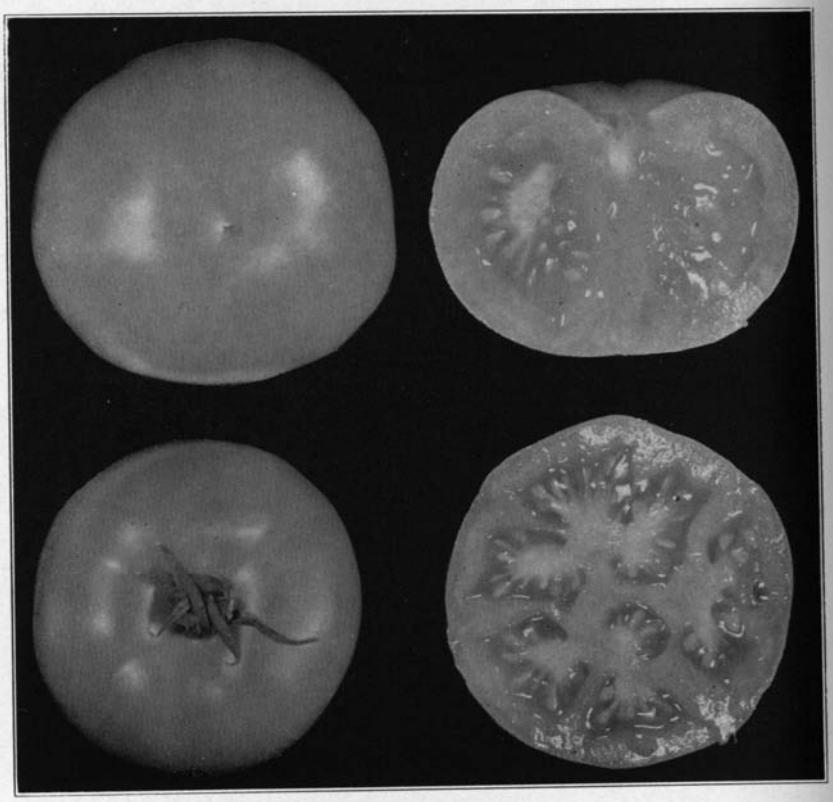
Origin. A cross between Grand Rapids Forcing and Marglobe, now in the nineteenth generation from the cross. Mentioned in Illinois Station Bulletin 361 (now out of print) under its cross number 1001.

Vine type. Takes about 5 to 7 days longer than Blair Forcing or Lloyd Forcing to reach the topping stage. The leaves are more finely cut than Blair Forcing or Lloyd Forcing and are dark green. The set is lighter than Blair Forcing or Sureset Forcing, averaging three fruits per cluster in the fall and four in the spring. Marglobe averages one plus and 2 per cluster, respectively.

Fruits. Pink, practically globe-shaped, and resemble the Globe variety. Very thick rind; seed cells vary from four to six. Under adverse conditions the fruits are inclined to be angular and air pockets appear, a tendency observable in all globe-shaped types. The uniform color and the smoothness of the fruit give Urbana Forcing an exceptionally attractive appearance.

Yields. Tho Urbana Forcing usually produces fewer fruits than the four other greenhouse varieties described here, these fruits are generally heavier, so that Urbana Forcing is by no means the lowest yielder in the group.

Use. Urbana Forcing is suitable for the grower who prefers a globe-shaped pink fruit. If used for spring forcing the crop must be watered carefully and a mulch is preferable as the fruits show a tendency to crack. Trouble from this source does not occur in the fall and winter. Urbana Forcing matures about 10 percent more of its crop in the first month of picking than does Marglobe.



LLOYD FORCING

LLOYD FORCING

FOR GREENHOUSE

(Resistant to Fusarium wilt)

Origin. A cross between Louisiana Pink and Grand Rapids Forcing, now in the eighteenth generation from the cross. Described at length in Illinois Station Bulletin 361.

Vine type. Blair Forcing and Lloyd Forcing vines are so similar that it is difficult to distinguish them. This might be expected as they originated from the same cross. The set averages about 3.3 mature fruits per cluster in the fall and 5.7 in the spring.

Fruits. Red, smooth, oblate, resembling Blair Forcing very closely except for color. The seed cavities are small and vary from three to seven or more. Like Blair Forcing, the fruits are exceptionally solid, with a small core and a medium-thick rind. Lloyd Forcing is a free seeder. The fruits rarely become puffy. They were pleasantly acid under all the conditions of these tests. Under adverse conditions, such as low temperatures, insufficient light, or improper fertilization, the fruits tend to become a little rougher than in the globe-shaped varieties. However, owing to the good set these may be thinned out profitably. Under adverse growing conditions, principally lack of light and subnormal temperatures, Lloyd Forcing has a tendency to grow horn-like projections at the stem end. This tendency, which has been noted in several of the most productive greenhouse varieties, seems to be infrequent in the globe-shaped types. However, even after all such imperfect fruits are sorted out, the yields of Lloyd Forcing are still very superior to those of other varieties (see table, page 22).

Yields. Lloyd Forcing is unquestionably the most consistently productive variety ever grown at the Illinois Station. It is so superior that it is usually used at the Station as the standard for measuring the yields of other types and varieties (see table). Quite a number of greenhouse growers are now growing it commercially. In weight per fruit it equals Marglobe and Bonny Best.

Use. Lloyd Forcing is suitable for both fall and spring crops. Its rapid growth and unusual vigor are important factors in cutting down costs of pruning, pollinating, etc. It will mature about 10 percent more of its crop than Marglobe during the first month of picking in the fall and about 20 percent more in the spring.

LONG CALYX FORCING

LONG CALYX FORCING

FOR GREENHOUSE

(Resistant to Fusarium wilt)

Origin. A seventeenth generation selection out of a cross between Lloyd Forcing and Marglobe.

Vine type. Resembles Sureset Forcing in vine character and rate of growth. The leaves, however, are a little more finely cut than Sureset Forcing. The set averages about 2.5 marketable mature fruits per cluster in the fall and 5.0 in the spring.

Fruits. Red, globe-shaped, thick rind, four to five seed cells, and not many seeds. Fruits are fleshy, only slightly acid in flavor, and not very juicy. The core is small and the appearance of the fruits is outstanding when in the market package. Like many globe-shaped varieties, air pockets form under certain conditions and give the fruits a slightly more angular appearance than normal. The flesh is rather soft in texture, but the skin seems to be so tough that an unusual amount of pressure is required to crack the fruits, as proved by actual tests. The fruits are very attractive because of the unusually long calyxes which, in contrast to other varieties, adhere very firmly to the fruits and are not readily broken off in picking and handling.

Yields. Long Calyx Forcing yields more than Bonny Best and Marglobe in the fall (see table), but it is inferior to Urbana Forcing, Sureset Forcing, Blair Forcing, and Lloyd Forcing. In the spring, however, Long Calyx Forcing is among the best yielders. Its fruits averaged about 4 ounces each in four successive spring crops. This is a large size for a greenhouse tomato.

Use. Long Calyx Forcing may be used for winter and spring forcing. It should be of value to the grower who wants an exceptionally attractive pack. It matures about 25 percent more of its crop during the first month of picking than Marglobe, which places it slightly earlier in maturity than Lloyd Forcing.

Yields per Plant of Sorted Marketable Fruits From Greenhouse Tomato Varieties

Forcing strain tested	Yield from strain tested			Yield from check		
	Number	Pounds	Average weight per fruit in pounds	Number	Pounds	Average weight per fruit in pounds
Fall crop 1931 (Bonny Best used as a check)						
Urbana	16	3.36	.20	11	2.61	.24
Lloyd	24	4.72	.20	11	2.61	.24
Blair	24	4.30	.18	14	2.86	.21
Sureset	20	3.51	.18	14	2.86	.21
Long Calyx	16	3.03	.18	8	2.06	.24
Spring crop 1932 (Lloyd Forcing used as a check)						
Urbana	30	7.62	.25	34	6.73	.20
Blair	39	6.78	.17	34	6.73	.20
Sureset	43	8.08	.19	34	6.73	.20
Long Calyx	37	8.89	.24	34	6.73	.20
Fall crop 1932 (Lloyd Forcing used as a check)						
Urbana	15	2.82	.19	15	2.84	.19
Blair	18	2.71	.15	19	3.28	.18
Sureset	21	3.15	.15	19	3.23	.17
Long Calyx	14	2.47	.17	18	2.92	.17
Spring crop 1933 (Lloyd Forcing used as a check)						
Urbana	25	6.22	.25	36	9.41	.26
Blair	39	8.42	.22	33	9.27	.28
Sureset	36	8.00	.22	33	9.31	.28
Long Calyx	35	8.64	.25	32	9.34	.29
Fall crop 1933 (Marglobe used as a check)						
Urbana	14	2.76	.20	8	1.72	.22
Lloyd	18	3.48	.19	8	1.72	.22
Blair	20	3.22	.16	8	1.72	.22
Sureset	23	3.57	.16	8	1.72	.22
Long Calyx	18	2.96	.16	8	1.63	.20
Spring crop 1934 (Marglobe used as a check)						
Urbana	27	7.82	.29	17	4.56	.28
Lloyd	38	10.37	.27	17	4.56	.28
Blair	39	7.98	.20	15	4.23	.28
Sureset	42	8.46	.20	13	3.38	.26
Long Calyx	34	8.43	.25	12	3.21	.26
Fall crop 1934 (Lloyd Forcing used as a check)						
Sureset	18	2.99	.16	17	3.14	.19
Long Calyx	14	2.37	.17	17	3.14	.19
Spring crop 1935 (Lloyd Forcing used as a check)						
Sureset	46	8.23	.18	44	10.62	.24
Long Calyx	33	7.85	.23	44	10.62	.24

Note. All crops except that of the fall of 1931 were grown in ground beds, with a planting distance of 16 x 30 inches, trained to a single stem, and topped at 9 feet with 7 clusters. The fall crop of 1931 was grown in benches, with a planting distance of 18 x 20 inches, trained to a single stem, and topped at 72 inches with 5 clusters.